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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
MEW, KEVIN D	

ART UNIT	PAPER NUMBER
2664	

DATE MAILED: 12/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/837,329	TOSHIMITSU ET AL.	
	Examiner	Art Unit	
	Kevin Mew	2664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 April 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,16,17,19 and 20* is/are rejected.

7)☒ Claim(s) *12-15 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 April 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: reference numeral 24 in Fig. 18. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-2, 4, 7, 10, 16-17, 19-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1-2, 4, 7, 10, 16-17, 19-20, the phrase "substantially" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "substantially"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 4, 6-9, 17, 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Molnar et al. (USP 6,694,154).

Regarding claim 1, Molnar discloses a radio base station for transferring signals (base station uses a directional beam antenna to generate a plurality of narrow beams for processing

calls a call from one or more mobile stations, see col. 5, lines 59-67 and col. 6, lines 1-11) of time division multiplexed frames (using TDMA protocol, see col. 5, lines 46-50) with respect to a plurality of radio terminals (mobile stations, see col. 6, lines 8-11), the radio base station comprising:

a beam formation unit configured to form a plurality of space dividing beams simultaneously (a beamforming processor is used in the base station to selectively direct the required number of beams toward the target mobile terminal, see col. 11, lines 40-50);

a plurality of antenna elements (antenna elements 505, 510, 515, see Fig. 5) configured to transfer the signals with respect to the radio terminals by transmitting the plurality of space dividing beams toward the radio terminals (antenna elements are connected to the beamformer circuit 520 which shapes and steers the plurality of beams which are tailored to maximize the signal-to-interference ratio of the signals received from the mobile terminal, see col. 9, lines 19-29, col. 11, lines 44-50 and Fig. 5); and

a scheduling processing unit (interference-rejection-combining receiver for use in the base station, see col. 5, lines 15-17) configured to allocate communication bandwidths to the radio terminals (the channel tap estimators of the interference-rejection-combining receiver produce channel tap estimates which are used to model the radio transmission channel associated with each antenna element, see col. 10, lines 51-67) such that there is substantially no mutual interference among those signals to be transferred by different frames (to separate the wanted signals from the unwanted signals, see col. 3, lines 57-64), with respect to a plurality of frames (TDMA, see col. 5, lines 46-50) that are corresponding to at least one of the plurality of space

dividing beams (each beam is transmitting signals which are in the form of TDMA frames, see col. 6, lines 19-24 and Fig, 4).

Regarding claims 4 and 17, Molnar discloses the radio base station of claim 1, wherein the scheduling processing unit allocates a plurality of frame configuration information each indicating a frame configuration of a respective time division multiplexed frame (a plurality of cells in each supercell in a TDMA frame format, see col.18, lines 42-52 and Fig. 9b), to corresponding ones of the time division multiplexed frames respectively (each cell corresponds to a time slot of a TDMA frame, see col.18, lines 42-52 and Fig. 9b), and allocates communication bandwidths in different frames to different radio terminals (the channel tap estimators of the interference-rejection-combining receiver produce channel tap estimates which are used to model the radio transmission channel associated with each antenna element, see col. 10, lines 51-67) such that there is substantially no mutual interference among those signals to be transferred (each beam is transmitting signals which are in the form of TDMA frames, see col. 6, lines 19-24 and Fig, 4) with respect to the different radio terminals (to separate the wanted signals from the unwanted signals, see col. 3, lines 57-64).

Regarding claim 6, Molnar discloses the radio base station of claim 1, further comprising:

a memory unit configured to store weights respectively corresponding to the radio terminals, that are to be used in forming the plurality of space dividing beams (see col. 12, lines 22- 38); and

a weight control unit configured to set the weights to the beam formation unit (see col. 12, lines 22-38).

Regarding claim 7, Molnar discloses the radio base station of claim 6, wherein the scheduling processing unit allocates the communication bandwidths to the radio terminals such that there is substantially no mutual interference among those signals to be transferred with respect to the different radio terminals according to the weights corresponding the different radio terminals as stored in the memory unit (see col. 11, lines 40-50 and col. 12, lines 22-38; note that the adaptive beamformer will apply weights to the beams to allow the base station to selectively direct a required number of beams toward the target terminals in order to maximize the signal-to-interference ratio).

Regarding claim 8, Molnar discloses the radio base station of claim 6, wherein the scheduling processing unit handles a group of radio terminals with similar weights as an identical radio terminal (see col. 2, lines 44-67 and col. 3, line 1).

Regarding claim 9, Molnar discloses the radio base station of claim 6, wherein the beam formation unit (see element 800, Fig. 8) has a multi-beam formation circuit configured to form the plurality of space dividing beams simultaneously by weighting the signals to be transmitted or received by the antenna elements using the weights set by the weight control unit (see Fig, 8 and col. 12, lines 22-38).

Regarding claim 19, Molnar discloses the frame configuration method of claim 17, wherein the step allocates the communication bandwidths in the different frames to the different radio terminals (the channel tap estimators of the interference-rejection-combining receiver produce channel tap estimates which are used to model the radio transmission channel associated with each antenna element, see col. 10, lines 51-67) such that there is substantially no mutual interference (to separate the wanted signals from the unwanted signals, see col. 3, lines 57-64) among those signals to be transferred with respect to the different radio terminals, according to weights respectively corresponding to the radio terminals, that are to be used in forming a plurality of space dividing beams for transferring the signals between the radio base station and the radio terminals (see col. 11, lines 40-50 and col. 12, lines 22-38; note that the adaptive beamformer will apply weights to the beams to allow the base station to selectively direct a required number of beams toward the target terminals in order to maximize the signal-to-interference ratio).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2-3, 5, 10-11, 16, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar et al. in view of Patterson et al. (USP 5,736,959).

Regarding claims 2, 10, Molnar discloses all the aspects of the claimed invention set forth in the rejection of claim 1 above, except fails to explicitly show the radio base station of claim 1, wherein the scheduling processing unit allocates an entire frame configuration information indicating frame configurations of all the time division multiplexed frames to one of the time division multiplexed frames, and allocates communication bandwidths of an identical time in different frames to different radio terminals such that there is substantially no mutual interference among those signals to be transferred at the identical time with respect to the different radio terminals.

However, Patterson discloses a supercell that comprises of nine cells where each cell is assigned to one of nine equal time slots with full frequency allocated within each cell and SDMA is used to eliminate interference between cells scanned at the same time in adjacent supercells. A supercell is thus a time-division multiplexed cell of its nine cells (see col. 18, lines 35-67). Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine the interference-rejection-combining receiver of the base station of Molnar with the teaching of the supercell formation in Patterson such that a multiplexed supercell is

formed that comprises a plurality of cells with equal time slots, each of which is physically separated (see Fig. 9b). The motivation to do so is to eliminate interference between cells scanned at the same time in adjacent supercells and to achieve time-division multiple access among the cells in a supercell.

Regarding claim 3, Molnar discloses all the aspects of the claimed invention set forth in the rejection of claim 1 above, except fails to explicitly show the radio base station of claim 2, wherein the scheduling processing unit schedules such that the entire frame configuration information is notified to all the radio terminals simultaneously. However, Patterson discloses a supercell entry (see col. 18, lines 13-33 and Fig. 8a) in a TDMA frame and that cell N of all supercells (note that a supercell is interpreted as an entire frame) receive transmissions at the same time (see col. 18, lines 35-67, col. 19, lines 1-3 and Figs. 9a, 9b; since cell N of each supercell receives transmission at the same time, each supercell comprising nine equal cells will also receive transmission at the same time). Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to combine the interference-rejection-combining receiver of the base station of Molnar with the teaching of SDMA transmission method of Patterson such that each supercell is transmitted to the radio terminals at the same time. The motivation to do so is to enable the radio base station to serve multiple radio terminals at the same time, which allows rapid frequency re-use of the frequency spectrum.

Regarding claim 5, Molnar discloses all the aspects of the claimed invention set forth in the rejection of claim 1 above, except fails to explicitly show the radio base station of claim 4,

wherein the scheduling processing unit schedules such that the plurality of frame configuration information are notified to the radio terminals simultaneously. However, Patterson discloses a plurality of cell entries (see col. 18, lines 13-33 and Fig. 9b in a TDMA frame) and that cell N of all supercells receives transmissions at the same time (see col. 18, lines 35-67, col. 19, lines 1-3 and Figs. 9a, 9b). Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to combine the interference-rejection-combining receiver of the base station of Molnar with the teaching of SDMA transmission method of Patterson such that a plurality of cells are transmitted to the radio terminals at the same time. The motivation to do so is to enable the radio base station to serve multiple radio terminals at the same time, which allows rapid frequency re-use of the frequency spectrum.

Regarding claim 11, Molnar discloses all the aspects of the claimed invention set forth in the rejection of claim 10 above, except fails to explicitly show discloses the frame configuration method of claim 10, wherein the step (a) allocates the entire frame configuration information to a frame to which a control information to be transmitted to all the radio terminals simultaneously allocate. However, Patterson discloses channel information is to be used in a TDMA frame (see col. 18, lines 1-10 and Fig. 8a). Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to combine the interference-rejection-combining receiver of the base station of Molnar with the teaching of using channel information in a TDMA frame such as the one taught by Patterson. The motivation to do so is to use the channel information to specify time slots, frequency, coding scheme, terminal identifier, and cell designation.

Regarding claim 16, Molnar discloses all the aspects of the claimed invention set forth in the rejection of claim 10 above. Molnar further discloses allocating weights respectively corresponding to the radio terminals, that are to be used in forming a plurality of space dividing beams for transferring the signals between the radio base station and the radio terminals (see col. 11, lines 40-50 and col. 12, lines 22-38; note that the adaptive beamformer will apply weights to the beams to allow the base station to selectively direct a required number of beams toward the target terminals in order to maximize the signal-to-interference ratio). Molnar does not explicitly show the frame configuration method of claim 10, wherein the step allocates the communication bandwidths of the identical time in the different frames to the different radio terminals such that there is substantially no mutual interference among those signals to be transferred at the identical time with respect to the different radio terminals.

However, Patterson discloses a supercell that comprises of nine cells where each cell is assigned to one of nine equal time slots with full frequency allocated within each cell and SDMA is used to eliminate interference between cells scanned at the same time in adjacent supercells. A supercell is thus a time-division multiplexed cell of its nine cells (see col. 18, lines 35-67). Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine the interference-rejection-combining receiver of the base station of Molnar with the teaching of the supercell formation in Patterson such that a multiplexed supercell is formed that comprises a plurality of cells with equal time slots, each of which is physically separated (see Fig. 9b). The motivation to do so is to eliminate interference between cells

scanned at the same time in adjacent supercells and to achieve time-division multiple access among the cells in a supercell.

Regarding claim 20, Molnar discloses a computer usable medium having computer readable program codes embodied therein for causing a computer function as a scheduling processing unit in a radio base station (programmed microprocessor, see col. 10, lines 20-34) for transferring signals of time division multiplexed frames with respect to a plurality of radio terminals, the computer readable program codes include:

a second computer readable program code for causing said computer (programmed microprocessor, see col. 10, lines 20-34) allocate communication bandwidths in different frames to different radio terminals (the channel tap estimators of the interference-rejection-combining receiver produce channel tap estimates which are used to model the radio transmission channel associated with each antenna element, see col. 10, lines 51-67) such that there is substantially no mutual interference among those signals to be transferred with respect to the different radio terminals (to separate the wanted signals from the unwanted signals, see col. 3, lines 57-64).

Molnar does not explicitly show a first computer readable program code for causing said computer to allocate an entire frame configuration information indicating frame configurations of all the time division multiplexed frames to one of the time division multiplexed frames.

However, Patterson discloses a supercell that comprises of nine cells where each cell is assigned to one of nine equal time slots with full frequency allocated within each cell and SDMA is used to eliminate interference between cells scanned at the same time in adjacent supercells. A supercell is thus a time-division multiplexed cell of its nine cells (see col. 18, lines 35-67).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine the interference-rejection-combining receiver of the base station of Molnar with the teaching of the supercell formation in Patterson such that a multiplexed supercell is formed that comprises a plurality of cells with equal time slots, each of which is physically separated (see Fig. 9b). The motivation to do so is to eliminate interference between cells scanned at the same time in adjacent supercells and to achieve time-division multiple access among the cells in a supercell.

Allowable Subject Matter

5. Claims 12-15, 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

In claim 12, the frame configuration method of claim 11, wherein when there is a difference between total sums of the communication bandwidths allocated to the time division multiplexed frames, the step (b) allocates a next communication bandwidth to a frame for which a total sum of allocated communication bandwidths is smaller.

In claim 18, the frame configuration method of claim 17, wherein the step (b) allocates a next communication bandwidth to a frame for which a total sum of allocated communication bandwidths is smallest among the time division multiplexed frames.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure with respect to radio base station and frame configuration method using TDMA scheme and SDMA scheme.

US Patent 5,408,237 to Patterson et al.

US Patent 6,212,387 to McLaughlin et al.

US Patent 5,805,576 Worley, III et al.

US Patent 6,067,290 to Paulraj et al.

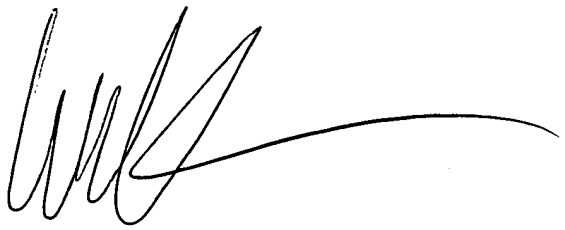
US Patent 4,004,098 to Shimasaki

US Patent 5,260,968 to Gardner et al.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Mew whose telephone number is 571-272-3141. The examiner can normally be reached on 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wellington Chin can be reached on 571-272-3134. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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